REMARKS

Claims 1-14 and 28-29 are pending in the application.

Claims 15-27 and 30 are withdrawn from consideration above.

I. INVENTOR'S DECLARATION

A Declaration by one of the application inventors - Peter Graham Richardson – accompanies this Reply. A copy of the Declaration is attached at Appendix A of this Reply. Mr. Richardson's Declaration – which is discussed and quoted in Section III below, discusses the claimed invention and the teachings of the prior art references and identifies differences between the claimed invention and the prior art cited by the examiner in rejecting the pending application claims for obviousness.

II. THE RESTRICTION REQUIREMENT

The examiner maintained the requirement to restrict the claims of the present application to one of two inventions despite Applicant's traverse. While Applicant continues to disagree with the examiner's restriction requirement, they have withdrawn claims 15-27 and 30 from consideration above. The Applicant reserves the right to request reinstatement of the withdrawn claims.

III. THE OBVIOUSNESS REJECTION TRAVERSE

The examiner rejected all pending claims 1-4 and 28-29 for being obvious over Maalouf (USPA 2002/122002) in view of the Zatman article. It is the examiner's position that Maalouf discloses all of the features of independent claim 1 except for a processor to generate space-time signals or steering time delay to produce at least two delayed signals. The examiner relies upon the Zatman article for disclosing this feature and takes to the position that it would have been obvious to modify Maalouf with recited feature of Zatman "in order to reduce dispersion". (See paragraph 5 of the April 3, 2009 Office Action).

In rejecting claims under 35 U.S.C. § 103(a), the Examiner bears the initial burden of establishing a prima facie case of obviousness. *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992). *See also In re Piasecki*, 745 F.2d 1468, 1472 (Fed. Cir. 1984). It is incumbent upon the Examiner to establish a factual basis to support the legal conclusion of obviousness. *See In re*

Fine, 837 F.2d, 1071, 1073 (Fed. Cir. 1988). In so doing, the examiner is expected to make the factual determinations set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966), *viz.*, (1) the scope and content of the prior art; (2) the differences between the prior art and the claims at issue; and (3) the level of ordinary skill in the art. Additionally, in making a rejection under 35 U.S.C. § 103(a) on the basis of obviousness, the Examiner must provide some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness. *KSR Int'l. Co. v. Teleflex Inc.*,127 S.Ct. 1727, 1741 (2007). Only if this initial burden is met does the burden of coming forward with evidence or argument shift to the appellant. *See Oetiker*, 977 F.2d at 1445. *See also Piasecki*, 745 F.2d at 1472. Obviousness is then determined on the basis of the evidence as a whole and the relative persuasiveness of the arguments. *See Oetiker*, 977 F.2d at 1445; *Piasecki*, 745 F.2d at 1472.

Applicant's analysis below demonstrates that all pending claims are non-obvious, as an analysis following the factual inquiries laid out in Graham v. John Deere Co. clearly reveals that the findings of fact articulated by the Examiner are improper and cannot be found to support an obviousness rejection of the claimed invention. More specifically, all pending claims are non-obvious at least because the combination of references does not disclose or suggest the claim feature of introducing a steering delay to space-time processed signals as required by claim 1 and as explained in more detail below.

A. The Presently Claimed Invention

The pending claims are directed to time delay beamformers. Of the pending claims, claim 1 is the sole independent claim. Notably, claim 1 is directed to a time delay beamformer that includes among other features: (1) a processor arranged to receive a plurality of sampled signals; (2) a processor that is arranged to generate space-time processed signals from the plurality of sampled signals; and (3) a steering time delay that is arranged to introduce a steering time delay to said processed signals. (See Richardson Dec. at ¶8). Thus, an important aspect of the claimed invention is that the steering time delay is introduced to the space-time processed signals. *Id.* Notably, the claims require that steering delay be applied to the "processed signals", i.e., the space-time processed signals.

B. The Cited Prior Art

1. The Maalouf Patent Application

Maalouf discloses conventional space time adaptive processing (STAP) architecture to suppress interference impinging on a GPS receiver while avoiding distortion of a GPS signal. The Maalouf architecture includes a plurality of input channels, each carrying signal from an antenna element. Each channel is sampled at a plurality of points in time to produce a plurality of sampled signals. These signals are provided to a processor which processes them using conventional STAP techniques to produce a plurality of processed signals. These processed signals are summed together to form a beamformed output. (See Richardson Dec. at §5).

Maalouf neither teaches nor suggests the use of a steering time delay, and in particular does not teach or suggest the use of a steering time delay to space-time processed signals.

2. The Zatman Article

Zatman relates to the use of STAP for the elimination of clutter in airborne radar systems. Such systems comprise a plurality of input channels, each carrying signal from an antenna element. Each channel is sampled at a plurality of points in time to produce a plurality of sampled signals which are provided to a processor, which processes them using conventional STAP techniques to produce a plurality of processed signals. Zatman notes that practical performance of STAP algorithms is affected by radar bandwidth. Zatman proposes to reduce the effects of spatial dispersion in a wideband array by using time delay steering of signals received from antenna elements before STAP processing. Zatman proposes that such time delay steering be carried out not only in a spatial dimension, but also in a Doppler dimension. (See Richardson Dec. at ¶7).

In order to completely understand the Zatman article, Mr. Richardson personally contacted the article author and subsequently reviewed the presentation materials themselves which were provided by Michael Zatman, the author of Zatman ASAP and the principal author of Zatman IEEE which was cited an IDS submitted by the Applicant and considered an initialed by the examiner on June 18, 2007 . Mr. Richardson's understanding following his review of the documents and following discussion with Michael Zatman is that the technical teaching of Zatman ASAP is essentially that of Zatman IEEE. (See Richardson Dec. at ¶6). What Zatman discloses is that time delays are applied to a plurality of input channels before any space-time processing takes place. In Zatman, the time-delayed input signals are sampled at a plurality of points, and space-time processing is carried out on the time-delayed input signals and the sampled time-delayed input

signals to produce space-time processed signals. These space-time processed signals are then summed to produce a beamformed output signal. An architecture of this general type is illustrated in Figure 1 of my patent application. (See Richardson Dec. at ¶10).

C. Differences Between The Claimed Invention And The Cited Prior Art

The invention of independent claim 1 differs from the teaching of the cited prior art in that in the claimed invention, the time delay steering is performed on space-time processed signals, whereas Zatman proposes space-time processing of time delayed input signals. The inventors discovered that this approach is effective to remove beam squint (the variation of beam direction with frequency) without degrading clutter suppression and hence the detection of slow moving targets. (See Richardson Dec. at ¶11). Further advantages are discussed in my patent application at page 3, line 23 to page 4, line 6, for example. Figure 5 of the present patent application illustrates the effectiveness in simulation of an exemplary beamformer according to my invention in providing an evident target return. This is compared to Figure 3 which illustrates the lesser effectiveness in simulation of a comparable beamformer in which space-time processing is carried out on time delayed input signals. *Id.*

D. All Pending Claims Are Non-Obvious

As noted above, it is incumbent upon the examiner to make out a prima facie case of obviousness. In order to make out a prima facie case of obviousness, the examiner must show that all claim features are disclosed or suggested by the prior art of record. Here the examiner has not made out a prima facie case of obviousness. As noted in sections A-C above, the prior art discloses many but not all features of the claimed invention. At least one independent claim 1 feature not disclosed is a steering time delay that is arranged to introduce a steering time delay to space-time processed signals. For at least this reason, independent claim 1 is non-obvious and patentable over the cited prior art. Claims 2-14 and 28-29 are also non-obvious and patentable at least by virtue of their dependence upon claim 1.

CONCLUSION

Pending claims 1-14 and 28-29 are believed to be patentable for at least the reasons recited above. Favorable reconsideration and allowance of all pending application claims is courteously solicited.

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